US Army Medical Research and Materiel

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Protein Biomarker for Mustard Chemical Injury

The invention provides a method for use in evaluating exposure and response to mustard gas. It relates to the identification of a protease that can be stimulated by exposing normal human epidermal keratinocytes (NHEK) cells to mustard gas. When NHEK cells are exposed in the presence of calcium ions, the protease is inhibited by leupeptin at 1mM concentration but not by pepstatin at the same concentration. The invention uses antibodies to identify the presence or absence of the protease biomarker in exposed tissues.

Mustard gas, also known as sulfur mustard and chemically formulated as bis-(2-chloroethyl) sulfide (HD), is a chemical warfare agent. HD and another vesicating agent, chloroethylethyl sulfide (CEES), stimulate protease activity in NHEK cells, Hela cell lines, and human peripheral blood lymphocytes. Toxic effects include protease stimulation, cutaneous degradation, and blister formation. DNA is considered to be its major intracellular target. The exact mechanism of mustard gas toxicity remains unclear and no effective antidote has been reported in the literature.

The invention may identify mustard-related pathologies more economically and efficiently than current methods that require histopathologic and electron microscopic studies.

Features and advantages:

- ***In vivo* and *in vitro* exposure levels have been measured**
- **Uses polyacrylamide gel electrophoresis**
- **New protein band exhibits protease activity and constitutes a biomarker protein**
- **Provides opportunities to tag the antibodies with colorometric, fluorescing, and radioactive tags**
- **Could detect the biomarker with Western blots or enzyme-linked (ELISAS)**

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